

# PATENT SPECIFICATION



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237,889

Application Date (in United Kingdom): July 15, 1925. No. 18,110 / 25.

Complete Accepted: Feb. 11, 1926.

## COMPLETE SPECIFICATION.

### Improvements in Mixing and Kneading Apparatus.

I, LOUIS ROBERT LEVRY, French citizen, Engineer, of 5, Passage St. Ambroise, Paris, France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to a mixing or kneading apparatus of the particular type comprising a trough, rollers in the interior thereof and arms for rotating the rollers about the axis of the trough.

The object of the present invention is to provide a mixing and kneading apparatus intended for the treatment of alimentary and other materials in the form of doughs of variable consistency, for instance, chocolate, biscuit doughs, mastics or the like. Whilst ensuring thorough mixing and kneading, the apparatus causes the dough to be subjected to compression which facilitates the agglomeration of the components or ingredients.

The mixing and kneading apparatus according to the present invention comprises essentially a rotary cylindrical or stationary semi-cylindrical bottomed trough, a plurality of rollers therein freely rotatable on arms rotating about the axis of the trough and a central cylinder of relatively large diameter leaving a small clearance between the said rollers, the roller spindles being either fixed or loosely mounted in slots in the arms with or without controlling springs.

Figure 1 of the accompanying drawing is a diagram showing one form of apparatus according to the invention.

Some forms of apparatus according to the invention comprise two concentric cylinders 1, 2.

[Price 1/-]

The material 3 to be mixed is poured into the annular space 4, and the cylinders are rotated about their common spindle  $x-x$ . The rollers two of which only are shown (5, 6), driven by arms 7 rotating about  $x-x$ , move in the annular space at any desired speed, either in the same direction, or in opposite directions according to the treatment to be given to the mixture. A slight clearance is left between the cylinders and the rollers. Owing to the adhesion of the material to the walls of the cylinders, the material is constrained to pass through the said clearances, and therefore is submitted to simultaneous compression and rolling.

Though very satisfactory as regards its working, such a device would in practice be of a delicate construction, from the point of view of tight joints.

It may here be noted that it is not new in itself to provide mixing and kneading apparatus with a rotating cylindrical trough.

The device shown diagrammatically in Figure 2 is a modification of the device and comprises a fixed vat or trough 1 with a semi-cylindrical bottom, in which rotates a cylinder 2 of a diameter smaller than that of the bottom of the trough; in the latter rotate also arms 7 carrying rollers 5—6.

It is obvious that the material introduced into the space 4, will be pushed back by the said rollers, and that owing to the compression due to adhesion, it will pass between the rollers and trough on the one hand, and the rollers and inner cylinder, on the other hand.

Replacing the inner cylinder by any other suitably sectioned roller makes it possible, in certain conditions of treatment, to obtain a beating action which increases the compression and assists the formation of the dough,

Price 2/-

The annular rollers may be cylindrical, or they may be of polygonal cross section in order to facilitate their penetration into the dough and either solid or 5 hollow, but they are free to rotate on their spindles or they may be rotated on their spindles  $y-y$  by means of countershafts operated by any obvious means.

Figures 3—5 show respectively in end elevation, in longitudinal elevation (partly in section) and in cross-section, an apparatus, by way of example. In these figures there is the trough 1 with 15 semi-cylindrical bottom, traversed longitudinally by the driving shaft  $x-x$ . The central cylinder, which, for clearness is not shown, is keyed to the driving shaft  $x-x$ . The rollers, only two of 20 which (5 & 6) are shown, are rotated by the arms 7 which are rigidly fixed to sleeves rotatable on the shaft  $x-x$ . The said sleeves extend through the bearings of the shaft  $x-x$  and are provided with 25 gear wheels, the two arms being rotated simultaneously from a pulley by means of a countershaft. This mechanism is not shown on the drawing as it does not constitute in itself a feature of the 30 invention.

As it is desirable that the dough or like substance being treated, should not accumulate in the space between the arms 7 and the ends of the trough, the 35 rollers (5 and 6) may be extended beyond the arms as shown on the right hand end of the roller 5 in Figure 4. The apparatus mounted on the bed 9, is completed by various accessories; spout 10 for the 40 discharge of the dough, cover 11 etc. The driving is effected by suitable means in accordance with standard practice, either by hand, by a crank or by means of driving pulleys etc. In the apparatus given by way of example, the tipping for emptying the trough is effected by means of a crank handle, worm and toothed quadrant (Figure 3).

It will be understood that the work of 50 the machine will differ according to the consistency of the dough. For instance if the dough is very liquid, there will be merely drawing out where the cylinder emerges from this dough, and on the contrary, where the cylinder enters the 55 dough again, there will be a beating produced by the rollers.

It is obvious that in the preceding explanation it has been assumed that 60 the quantity of material in the trough does not completely occupy the space beaten by the rollers.

In the case of a harder dough, the 65 rollers owing to their rotation will project part of the dough against the wall

of the trough. As the rollers return, they bring a little material which sticks to that already deposited. Moreover, the friction against this material produces the rotation of the roller as it is free to rotate on its spindle, and a consequent rolling of the dough which is drawn towards the bottom of the trough and which, also rises partly between the trough and the roller.

The mass of material to be treated will gradually rise along the wall of the trough until it drops down by gravity and is again submitted to the rolling, drawing, and beating produced by the rollers, and so on. The repetition of this series of operations produces finally a thorough agglomeration of the ingredients.

It will also be seen that when the dough is firm in consistency, it takes the shape of a roll which turns about itself. The machine therefore submits the dough to a persistent beating and kneading, as well as a rolling due to the rotation of the rollers.

The trough may be made of cast iron, sheet metal, granite or any other suitable material, and the rollers may be made of various materials, according to the products to be treated.

In order to give greater flexibility to the apparatus and to reduce the necessary driving effort, the roller spindles may be mounted in guides 12 enabling them in case of excessive resistance, to move towards the driving shaft. They may also be mounted so that their retrograde movements are controlled by springs arranged for instance in the interior of the arms.

A regulating means is thereby provided, whereby the apparatus may be quickly adapted to any special treatment to be carried out. The apparatus may be of any dimensions, from the household size to the industrial size.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A mixing and kneading apparatus of the type referred to characterised by the combination with a semi-cylindrical based trough of a plurality of rollers therein, freely rotatable on arms rotating about the axis of the trough and a central cylinder of relatively large diameter, leaving a small clearance between the rollers.

2. A mixing and kneading apparatus according to Claim 1, in which the trough is of cylindrical shape and cap-

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able of rotation about its longitudinal axis in either direction.

3. A mixing and kneading apparatus according to either of the foregoing claims in which the roller spindles are either fixed in slots in the arms or freely mounted to slide in the slots, with or without controlling springs.

4. A mixing and kneading apparatus according to either of the foregoing claims in which the rollers are adapted

to be rotated about their spindles by means of a countershaft.

5. The mixing and kneading apparatus substantially as described.

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Dated this 15th day of July, 1925.

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Chartered Patent Agents.

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*[This Drawing is a reproduction of the Original on a reduced scale]*

Fig. 1.

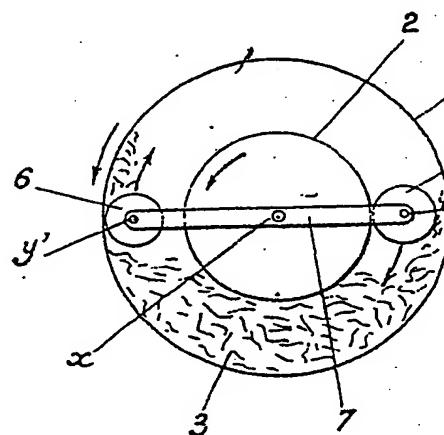


Fig. 2

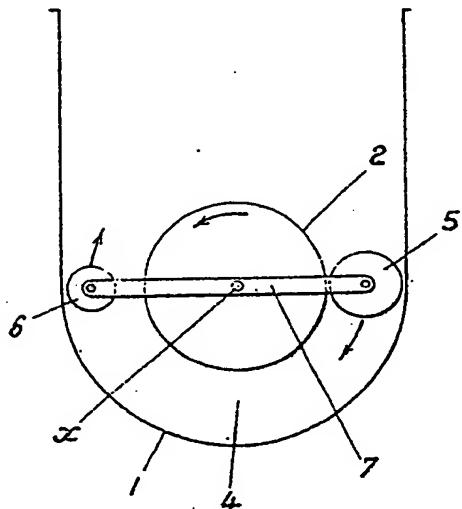


Fig. 3.

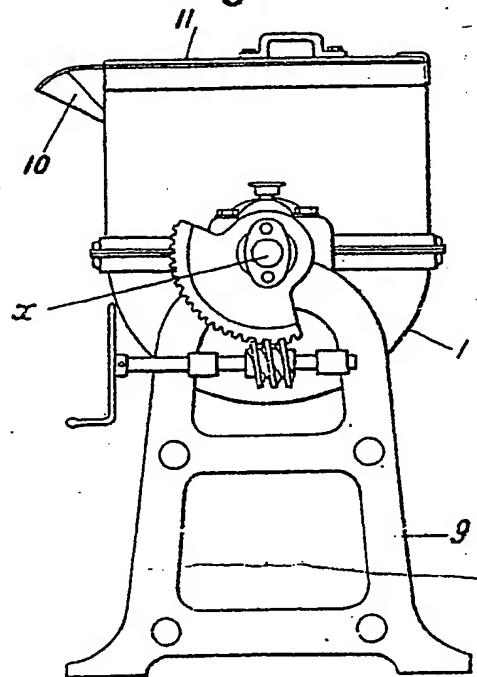
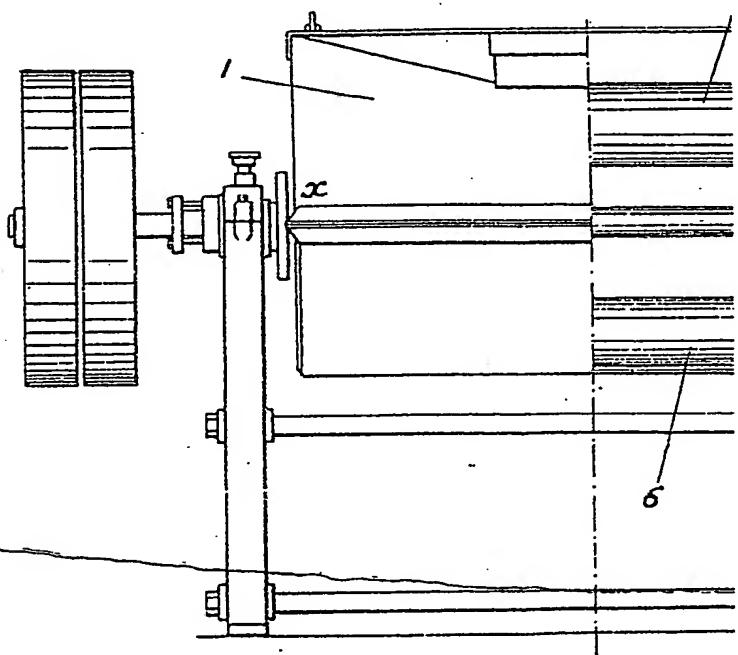


Fig. 4.



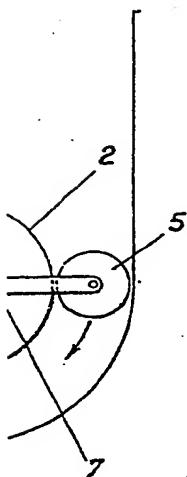


Fig. 4.

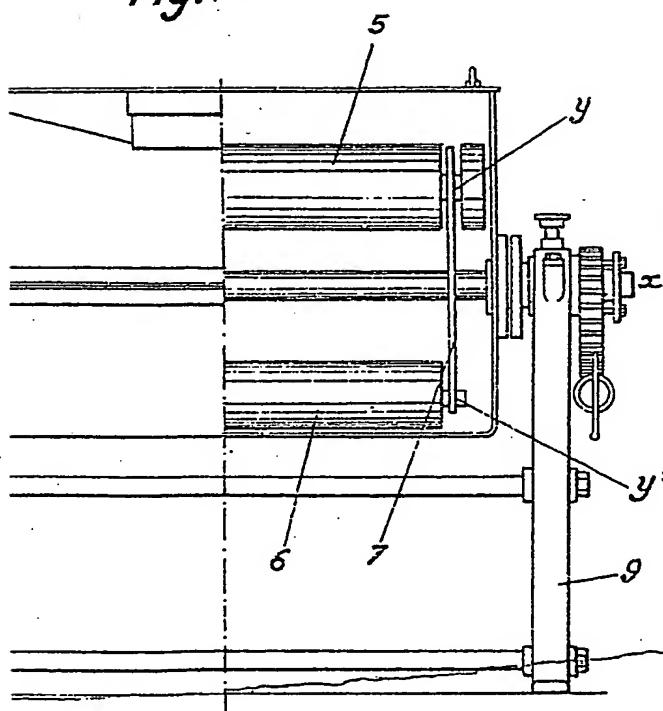
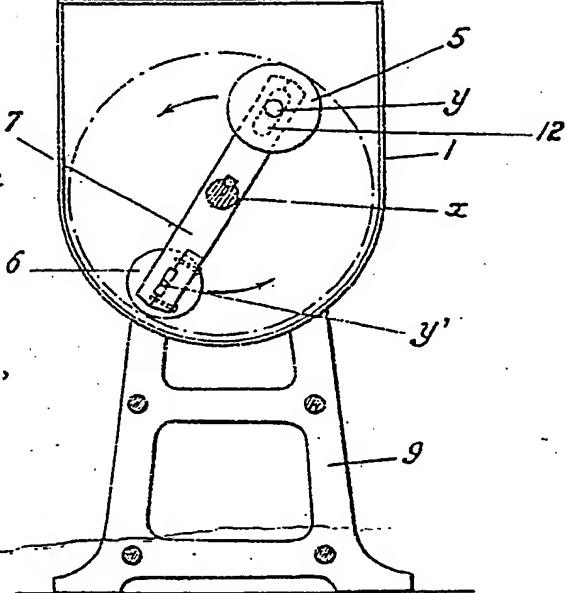
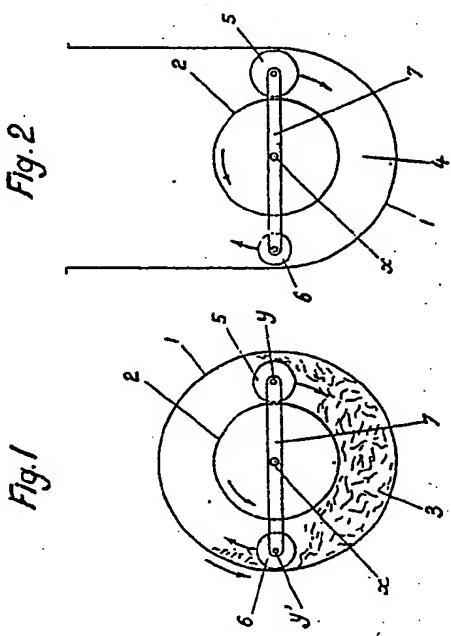


Fig. 5.





*Fig. 1*

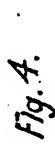


Fig. 5.

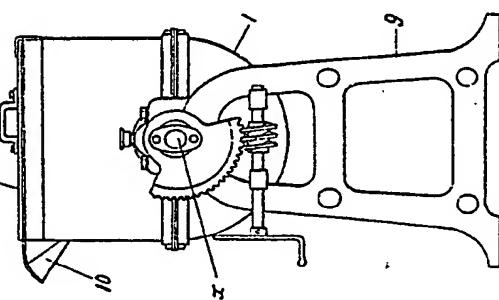


Fig. 3.

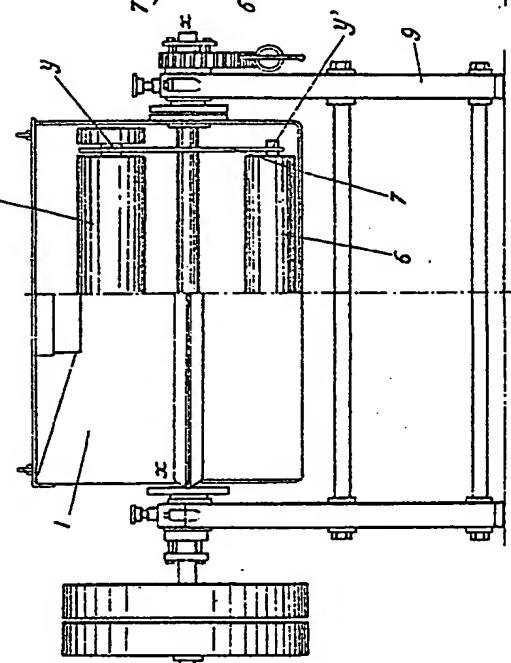


Fig. 4.

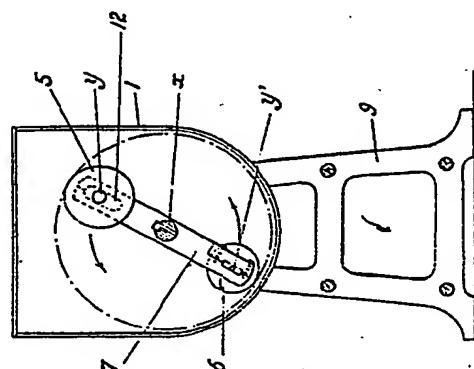


Fig. 5.

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Fig. 1.

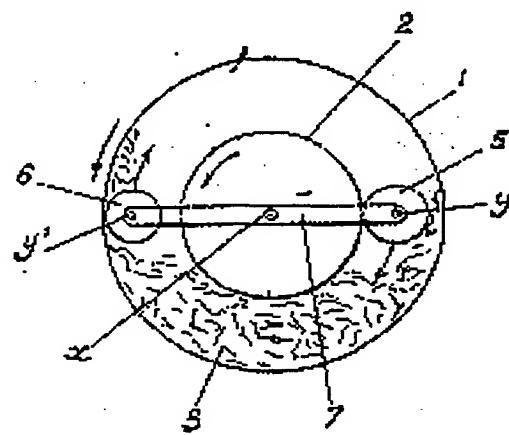


Fig. 2.

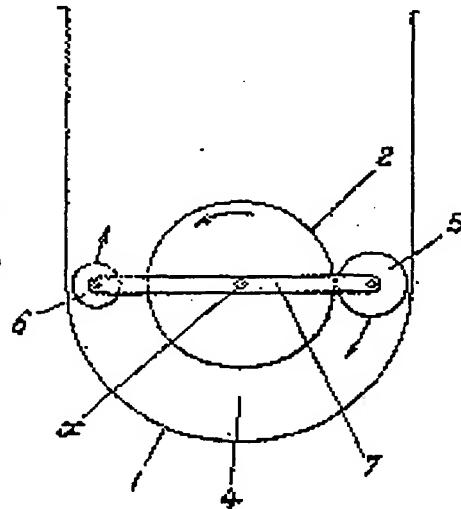


Fig. 3.

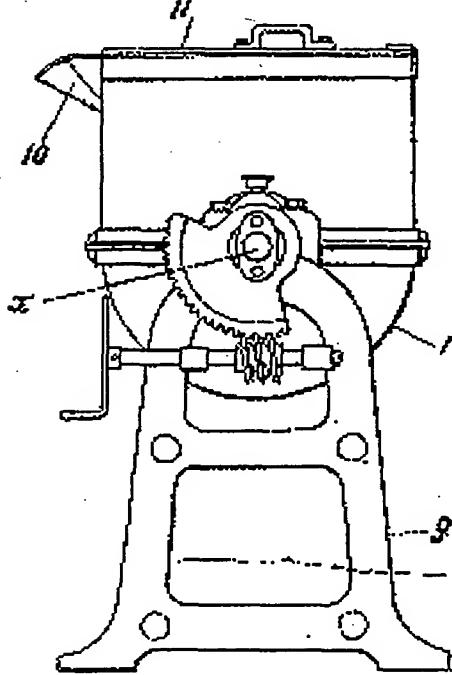
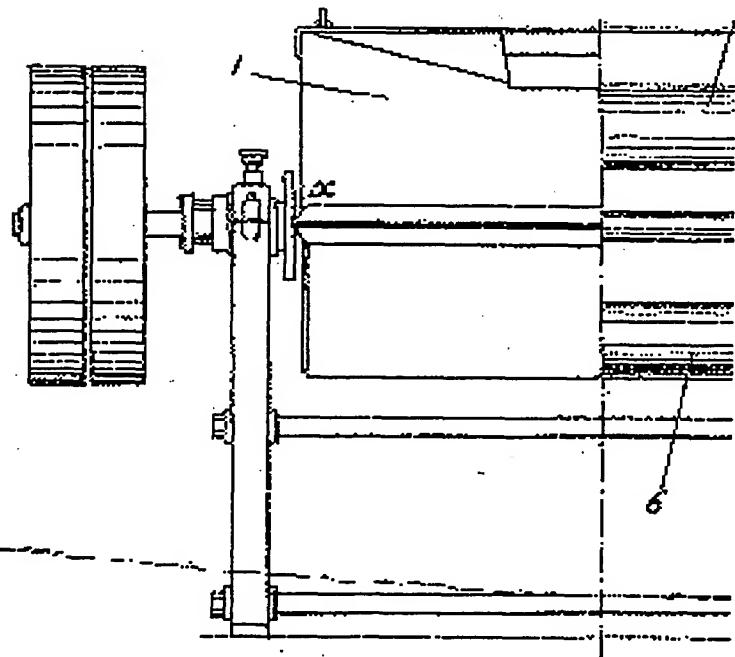
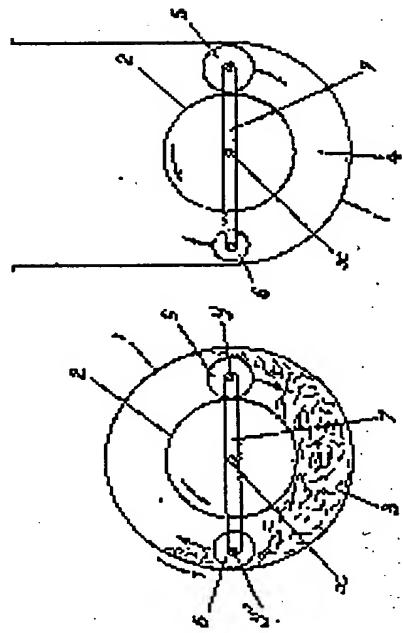


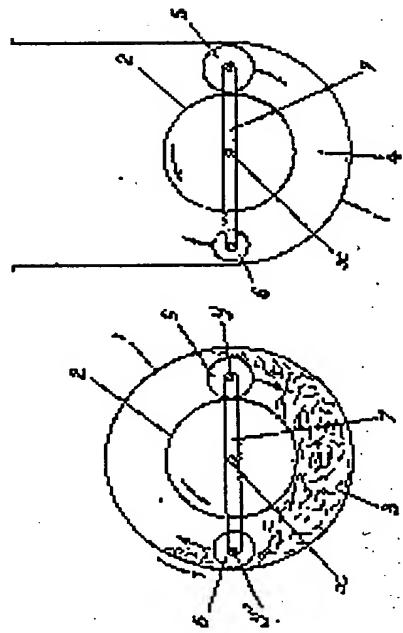
Fig. 4.



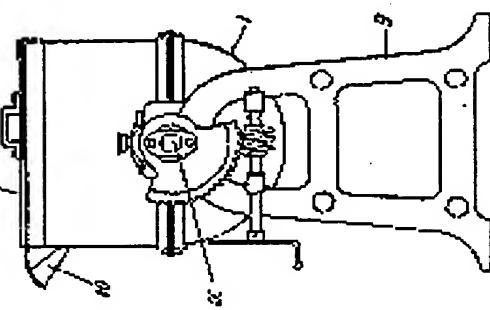
*Fig. 1*



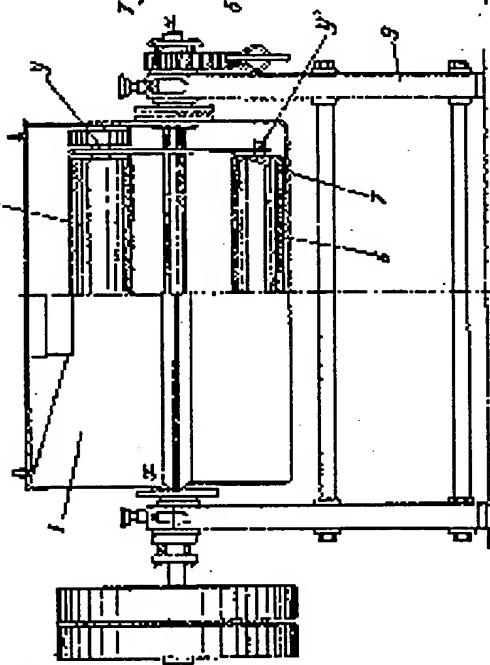
*Fig. 2*



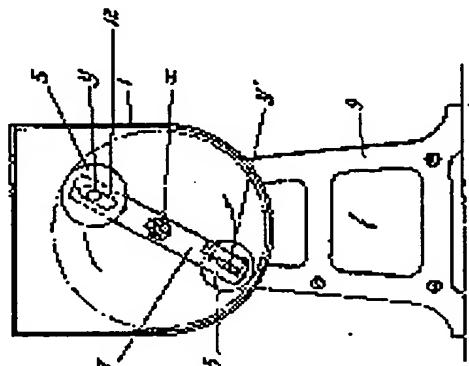
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



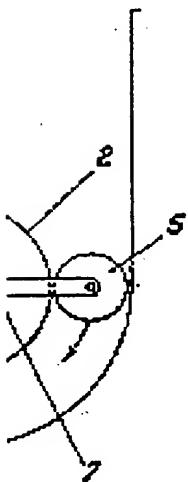


Fig. 4.

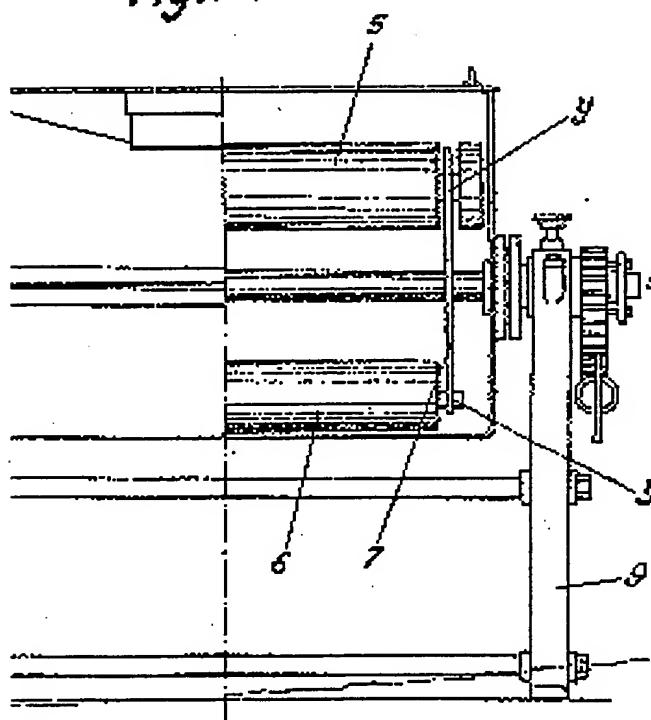


Fig. 5.

